

**REMARKS****INTRODUCTION:**

In accordance with the foregoing, claims 1-3 have been amended. No new matter is being presented, and approval and entry of the foregoing amendments are respectfully requested. Claims 1-17 and 29-39 are pending and claims 1-17, 38, and 39 are under consideration. Reconsideration is requested.

On page 2 of the Office Action, the Examiner requires cancellation of withdrawn claims 29-37 or other appropriate action. However, it is respectfully submitted that withdrawn claims 29-37 have been amended to depend from elected linking claim 1. As noted in MPEP 809.04, "[w]here the requirement for restriction in an application is predicated upon the nonallowability of generic or other type of linking claims, applicant is entitled to retain in the case claims to the nonelected invention or inventions." As such, it is respectfully requested that the withdrawn claims 29-37 be allowed to remain in the instant application as per MPEP 809 since the applicants have taken the other appropriate action required in the Office Action.

**REJECTION UNDER 35 U.S.C. §103:**

In the Office Action at pages 2-7, the Examiner rejects claims 1-4, 8-17, 38, and 39 under 35 U.S.C. §103 in view of Chu (U.S. Patent No. 5,523,179) and Japanese patent publication no. 47-28431 (hereinafter referred to as "JP '431"). The rejection is respectfully traversed and reconsideration is requested.

Among other features, the Examiner asserts that Chu teaches a lithium-sulfur battery using an active sulfur in a positive electrode and a lithium metal in the anode. However, the Examiner acknowledges on page 6 of the Office Action that Chu does not teach the positive electrode having pores as recited in claims 1-3. In order to cure this deficiency, the Examiner relies upon JP '431 as disclosing a cathode including sulfur and having pores in a range of 10-1000  $\mu\text{m}$ . As a motivation to combine the references, the Examiner relies upon the Abstract of JP '431 as teaching that, since sulfur is an electric insulator, a porous separator with pore diameters of 10-1000  $\mu\text{m}$  is essential to increase the conductivity.

However, even assuming arguendo that JP '431 suggests using pores to resolve a problem due to insulative properties of sulfur, it is noted Chu also teaches a solution to overcome the insulative problem of sulfur as set forth in col. 2, lines 5-26 and col. 9, lines 45-60 of Chu. As such, Chu already suggests a solution to the very problem which JP '431 purports to

solve. Additionally, Chu further resolves problems in regard to lithium depletion as set forth in col. 9, lines 5-60 which is not suggested as being resolved in JP '431.

There is further no suggestion in Chu that pores should be used, and there is no suggestion in JP '431 that the specific porosity presents a more advantageous solution than the solution set forth in Chu.

As a general matter, in order to establish a prima facie obviousness rejection, the Examiner needs to provide both the existence of individual elements corresponding to the recited limitations, and a motivation to combine the individual elements in order to create the recited invention. Both the individual elements and the motivation need to be shown to have existed in the prior art. Should the Examiner fail to provide evidence that either one of the individual elements or the motivation does not exist in the prior art, then the Examiner has not provided sufficient evidence to maintain a prima facie obviousness rejection of the claim. MPEP 2143.03. Thus, the burden is initially on the Examiner to provide evidence as to why one of ordinary skill in the art would have been motivated to combine the individual elements to create the recited invention, and to demonstrate that this evidence existed in the prior art. MPEP 2143.01.

Since JP '431 describes a solution to a problem already solved in Chu in regards to sulfur conductivity and does not suggest that the solution is advantageous over the solution proposed in Chu, and since Chu suggests resolving problems not accounted for by JP '431, it is respectfully submitted that there is insufficient evidence of record as to why one of ordinary skill in the art would modify Chu to incorporate the porosity of JP '431 as is required to maintain a prima facie obviousness rejection of claims 1-4, 8-17, 38, and 39.

Additionally, while the Examiner acknowledges on page 10-12 that the examples set forth in the specification demonstrate a difference in performance, the Examiner asserts that the examples are only relevant for a 5  $\mu\text{m}$  pore diameter. It is respectfully submitted that the combined examples demonstrate a trend not disclosed, suggested in, or expected from JP '431. Specifically, JP '431 suggests pores between 10-1000  $\mu\text{m}$ , and does not suggest which portion of this range would achieve the best conductivity. As such, there is no expectation as to which element of this large range would achieve the best conductivity, nor an invitation to explore pore diameters below 10  $\mu\text{m}$  or above 1000  $\mu\text{m}$ . In contrast, as shown in the examples in the specification, as the pore diameter decreases, performance improves in regard to at least long term capacity retention and discharge current density retention. No such expectation was set forth in JP '431 for pore diameters less than 10  $\mu\text{m}$ , and no suggestion that such a benefit exists so as to a specific subrange at the extreme low end of the 10  $\mu\text{m}$  or above 1000  $\mu\text{m}$  disclosed in

JP '431. Further, it is respectfully submitted that, as shown in Table 1, there is a benefit shown in ranges below 30 $\mu$ m, 15  $\mu$ m, and substantially at 5  $\mu$ m that is not suggested in or expected from JP '431 as would be required to choose the specific range within 10-1000  $\mu$ m for use in Chu in order to meet the features of claims 1, 2, and/or 3.

As noted in MPEP 2144.08, "a showing of unexpected results for a single member of a claimed subgenus, or a narrow portion of a claimed range would be sufficient to rebut a *prima facie* case of obviousness if a skilled artisan 'could ascertain a trend in the exemplified data that would allow him to reasonably extend the probative value thereof.' *In re Clemens*, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980) (Evidence of the unobviousness of a broad range can be proven by a narrower range when one skilled in the art could ascertain a trend that would allow him to reasonably extend the probative value thereof.)" It is respectfully submitted that, in view of the examples and Tables 1 and 2 of the instant application, applicants have shown a trend sufficient to rebut the *prima facie* obviousness rejection in view of the broad range of 10-1000  $\mu$ m disclosed in JP '431. Therefore, it is respectfully submitted that there is evidence of record suggesting the nonobvious and unexpected nature of the invention for which the Examiner needs to account in maintaining the obviousness rejection of claims 1-4, 8-17, 38, and 39, and for the ranges set forth in at least claims 2 and 3.

Lastly, in rejecting claims 2 and 3, the Examiner asserts that, since JP '431 sets forth pores having a diameter of 10-1000  $\mu$ m, the range also covers ranges from 5  $\mu$ m to 10  $\mu$ m and the diameter of 5  $\mu$ m. Specifically, the Examiner relies upon Titanium Metals Corp. of America v. Banner, 778 F.2d 775 (Fed. Cir. 1985) for the proposition that ranges that are outside of the specifically disclosed range remain obvious if the ranges are close enough to the disclosed range. However, it is respectfully submitted that differences discussed in Titanium Metals were for a claimed alloy amount within a range defined by two disclosed alloy amounts. By way of example, the disclosed alloys in Titanium Metals were for 0.25% Mo and 0.75% Ni and 0.31% Mo and 0.94% Ni. In contrast, the recited amount in Titanium Metals was for an alloy of 0.3% Mo and 0.8% Ni. As such, the disclosed alloys in Titanium Metals taught a range (i.e., between .25% Mo and 0.75% Ni and 0.31% Mo and 0.94% Ni) which included the recited alloy, making the disclosed alloys close enough to be considered obvious. Id. at 227 F.2d. 783. It is respectfully submitted that no disclosed pore size in JP '431 that is below the range recited in claim 2 or for the specific pore size recited in claim 3, which is in contrast to the alloys disclosed in Titanium Metals. Lastly, there is no evidence that JP '431 suggests that pore diameters falling well outside of the disclosed lower end of the range would necessarily have the same conductivity features are those within the disclosed range.

Generally, in order to provide sufficient evidence of record for the purposes of review under the Administrative Procedures Act, 5 U.S.C. §706, there needs to be more than an unsupported statement that an undisclosed item is suggested in the prior art. By way of example, the Federal Circuit has held that an unsubstantiated statement that elements could be combined as being "common sense" does not provide a basis for a rejection under 35 U.S.C. §103(a). In re Zurko, 59 USPQ2d 1693 (Fed. Cir. 2001). Therefore, it is respectfully submitted that the bare assertion that the undisclosed ranges and amounts are "close enough" does not meet the requirements for review under the Administrative Procedures Act, and stretches the holding of Titanium Metals beyond the facts actually decided therein. Thus, it is respectfully requested that the Examiner reconsider and withdraw the rejection of claims 2 and 3.

In the Office Action at pages 7-8, the Examiner rejects claims 5-7 under 35 U.S.C. §103 in view of Chu, JP '431, and Kovalev et al. (U.S. Patent No. 6,652,440). The rejection is respectfully traversed and reconsideration is requested.

The Examiner relies upon Kovalev et al. as disclosing a particle size of elemental sulfur in the range of 0.01 to 100 microns, but not as otherwise curing the above noted defect of the combinations of Chu et al. and JP '431 as applied to claim 4, from which claims 5-7, depend. As such, it is respectfully submitted that the combination does not disclose the invention recited in claims 5-7 due at least to the combinations not disclosing the features of claim 4. Additionally, Kovalev et al. suggests multiple particle sizes for elemental sulfur, including particles from .01 to 100 microns, but Kovalev et al. does not suggest which particle size should be used within this broad range, or which portion of the range is advantageous to use. Importantly, Kovalev et al. does not suggest why the disclosed elemental sulfur is advantageous over other elemental sulfurs, such as that disclosed in Chu et al. As similarly noted above, the examples in the instant application set forth evidence as the advantages of specific ranges of particle sizes which are not suggested in Chu et al., JP '431, or in the broad range suggested in Kovalev et al. Therefore, consistent with MPEP 2144.08, it is respectfully submitted that there is evidence of record suggesting the nonobvious and unexpected nature of the invention for which the Examiner needs to account in maintaining the obviousness rejection of claims 5-7.

#### **CONCLUSION:**

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, it is respectfully submitted that all pending claims patentably distinguish over the prior art. Thus,

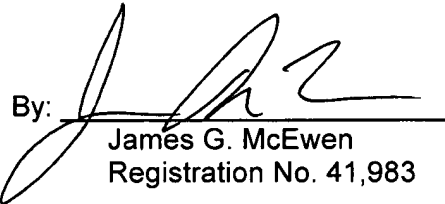
there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any additional fees associated with the filing of this Amendment, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

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